



Committee on Earth Observation Satellites

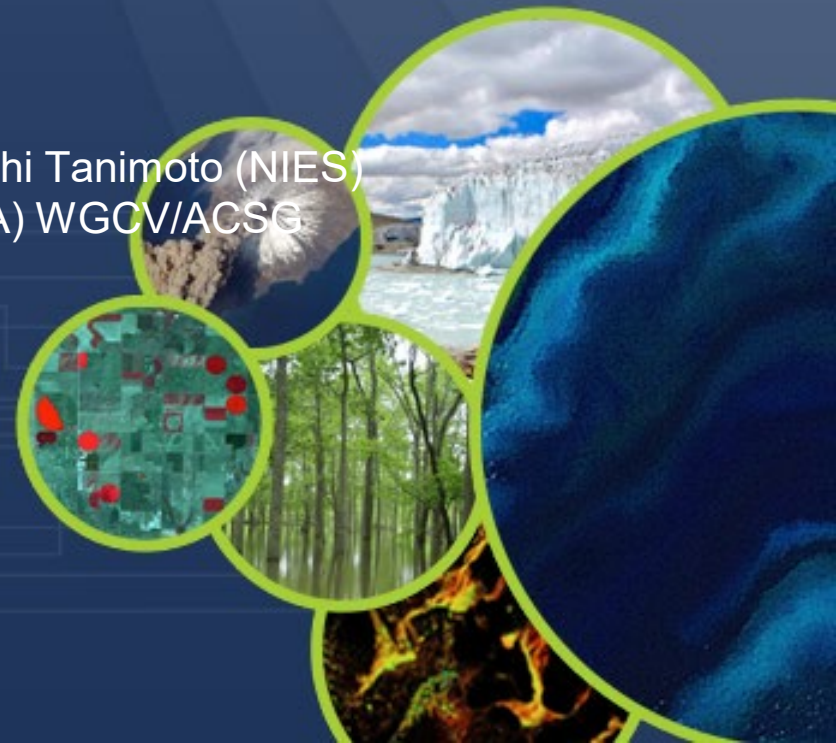
Geostationary Air Quality Constellation Validation Needs WP Recommendations Revisited

Ben Veihelmann (ESA), Barry Lefer (NASA), Hiroshi Tanimoto (NIES)
AC-VC co-chairs, Jean-Christopher Lambert (BIRA) WGCV/ACSG

AC-VC#19 2023

Brussels

24 – 27 October 2023





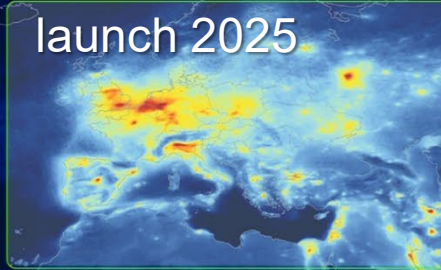
TEMPO (hourly)

launched April 2023



Sentinel-4 (hourly)

launch 2025



GEMS (hourly)

launched February 2020

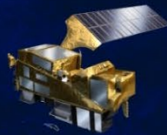


Equator

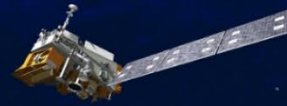
Complemented by LEO missions with strong AQ capabilities:



Sentinel-5P
(once per day)



Sentinel-5
(once per day)



OMPS
(once per day)



EMI GaoFen-5
(once per day)

Whitepaper '*Geostationary Satellite Constellation for Observing Global Air Quality: Geophysical Validation Needs*'

- written by the science teams of the GEMS, Sentinel-4, and TEMPO missions and validation experts including WG Cal/Val members
- Consolidation at AC-VC-15, June 2019, Tokyo, Japan
- Version 1.0 presented at SIT Technical Workshop, September 2019, Fairbanks, Alaska
- Version 1.1 endorsed by CEOS Plenary October 2019, Ha Noi, Vietnam
- <https://ceos.org/ourwork/virtual-constellations/acc/>
- [GEO AQ Constellation Geophysical Validation Needs 1.1 2Oct2019.pdf](#)

CEOS Work Plan Actions on AC-VC



ID	Title	Due	Description	Responsible	
VC-20-01	Tropospheric ozone dataset validation and harmonization	2022 Q4	Production of peer-reviewed papers on intercomparisons and harmonization of tropospheric column ozone data sets	AC-VC	Diego Loyola
VC-20-02	Air quality constellation validation coordination	2024 Q4	Coordinate implementation of recommendations expressed in CEOS document “Geostationary Satellite Constellation for Observing Global Air Quality: Geophysical Validation Needs”.	AC-VC, WGCV	Ben Veihelmann
VC-20-03	Air quality constellation validation coordination: validation plans	2022 Q4	Coordinate the writing of harmonized GEO-AQ mission validation plans.	AC-VC, WGCV	Ben Veihelmann
VC-20-04	Air quality constellation validation coordination: announcements of opportunity	2023 Q4	Coordinate the formulation of harmonized GEO-AQ Announcements of Opportunity supporting mission validation activities.	AC-VC, WGCV	Ben Veihelmann
VC-20-05	Aerosol air quality coordination	2021 Q4	Production of a white paper or peer-reviewed paper on satellite-informed products for air quality associated with aerosol	AC-VC	Shobha Kondragunta

- Elaborate the validation needs of the Geo-AQ Constellation: focus on
 - new challenges for **geostationary** atmospheric composition missions (new with respect to LEO heritage)
 - enhancing the success of missions when seen as elements of a constellation
- Identify 'Constellation Products'
 - common to the Geo-AQ missions
 - enhanced value by establishing and monitoring inter-mission consistency
- Set quantitative inter-mission consistency targets for Constellation Products
 - taking into account individual product performances and the accuracy of validation methods
- Identify activities needed to assess and establish this consistency
 - Activities to be performed consistently for each mission
 - Activities addressing new Geo-AQ challenges and inter-mission consistency
 - Coordination and continuity
- Make specific and actionable recommendations

1. Intensive campaigns: capability of observing the diurnal cycle from GEO.
2. Joint campaigns with exchange of airborne and ground-based instruments.
3. Pursue radiometric inter-calibration (WGCV-GSICS).
4. Pursue Level-2 inter-calibration.
5. Level-2 Constellation Products.
6. Harmonization of validation reference data.
7. Data centre for storage and exchange of all validation data.
8. Coordinating unit for ensuring the consistency of validation approaches and metrics.



Let us review

- Which recommendations have been followed to which degree?
- Gaps, problems?
- Specific actions?

→ Roadmap

